



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,312	01/18/2005	Farshad Ghasripor	3816-61	9865
30024	7590	11/14/2007	EXAMINER	
NIXON & VANDERHYE P.C. 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			GOLOBOY, JAMES C	
ART UNIT		PAPER NUMBER		
1797				
MAIL DATE		DELIVERY MODE		
11/14/2007		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,312	GHASRIPOOR ET AL.	
	Examiner James Goloboy	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 23 August 2007.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1, 3-4, 6-12, 18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1, 3-4, 6-12, 18 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

1. The rejections under 35 USC 102 and 103 set forth in the office action mailed 4/3/07 are overcome by applicant's amendment of 8/23/07. New grounds of rejection necessitated by the amendment are set forth below. The double patenting rejection in the office action mailed 4/3/07 is maintained despite the amendments.

Double Patenting

2. Claims 1, 3-4, 6-12, and 18 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of copending Application No. 10/500,309. Although the conflicting claims are not identical, they are not patentably distinct from each other.

Claim 13 of the '509 application discloses a sealing ring for piston of a reciprocating compressor, where the sealing ring comprises a self-lubricating plastics material as in claims 1 and 18 of the current application. Claims 2 and 5 of the '509 application disclose that polymer matrix of the self-lubricating plastics material can comprise polyketone, polybutadiene-styrene, or polytetrafluoroethylene, as recited in claims 1 and 18 of the current application. Claims 3-4 and 6-12 of the '509 application are analogous to claims 3-4 and 6-12 of the current application. Claims 1, 3-4, 6-12, and 18 are therefore anticipated by the claims of the '509 application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

3. Claims 1, 3-4, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumann (U.S. Pat. No. 5,033,940) in view of Beckmann and Kakehi.

In the abstract, Baumann discloses a reciprocating compressor comprising at least one high-pressure cylinder and piston unit. In column 3 lines 47-50 Baumann teaches that the pistons have a sealing ring and a guide ring made of a self-lubricating material such as Teflon. The differences between Baumann and the currently presented claims are:

- i) Baumann does not disclose a self-lubricating material comprising a polymer matrix with microcapsules containing a lubricating agent dispersed within.
- ii) Baumann does not disclose the specific lubricating agents recited in claim 1, although Baumann does suggest that Teflon, which can be polytetrafluoroethylene (PTFE), as a suitable self-lubricating material.

With respect to i), Beckmann discloses a plastic material comprising microcapsules containing a lubricant. In column 3 lines 16-18 Beckmann discloses that the plastic can comprise a wear-resistant component. In column 1 lines 7-10 Beckmann teaches that the plastic materials are preferentially used as frictionally stressed seals and guiding elements.

With respect to ii), Kakehi discloses in column 12 lines 42-53 and column 13 lines 14-22 (Examples 1-2) seals comprising polyetherether ketone (PEEK) and PTFE. The use of the PEEK/PTFE seal of Kakehi as the polymer in the plastic material of Beckmann, and the use of the resulting self-lubricating plastic material as the piston ring

of Baumann, meets the limitations of claims 1 and 3-4. In column 1 lines 37-42, Kakehi teaches that the seal reduces sliding friction between surfaces, as recited in claim 18

It would have been obvious to one of ordinary skill in the art to use the PEEK/PTFE seal of Kakehi as the polymer matrix in the plastic of Beckmann, and to use the resulting plastic as the piston ring of Baumann, as the plastic of Beckmann and Kakehi is self-lubricating, reduces sliding friction, and provides extra lubricating activity due to the lubricant-containing microcapsules.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumann in view of Beckmann and Kakehi as applied to claims 1, 3-4, and 18 above, and further in view of Dennen.

The discussion of Baumann in view of Beckmann and Kakehi in paragraph 3 above is incorporated here by reference. Baumann, Beckmann, and Kakehi disclose a piston ring meeting the limitations of claim 1, but Beckmann does not disclose the material used for the shell of the microcapsule.

In paragraphs 2 and 21, Dennen discloses a microcapsule with a polyoxymethylene urea shell that releases its contents after frictional contact, similarly to the microcapsules of Beckmann. While the microcapsules of Dennen contain a flavor oil and not a lubricant, it does relate to the problem of microcapsule shells that release their contents upon frictional contact. Where the general scope of a reference is outside the pertinent field of endeavor, the reference may be considered analogous art if subject

matter disclosed therein is relevant to the particular problem with which the inventor is involved. See MPEP 2141.01(a)(II).

It would have been obvious to one of ordinary skill in the art to use the polyoxymethylene urea shell of Dennen in the microcapsules of Baumann, Beckmann, and Kakehi, as Dennen teaches that such a shell will break and release its contents upon frictional contact.

5. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumann in view of Beckmann and Kakehi as applied to claims 1, 3-4, 6, and 18 above, and further in view of Korshak.

The discussion of Baumann in view of Beckmann and Kakehi in paragraph 3 above is incorporated here by reference. Baumann, Beckmann, and Kakehi disclose a piston ring made from a self-lubricating plastic in accordance with claim 1 which may comprise a liquid lubricant incorporated into the microcapsules but does not disclose the further addition of lubricant additives.

Korshak, in column 1 lines 4-17 and column 2 lines 1-13 discloses a self-lubricating plastic material. In column 4 lines 47-52 Korshak teaches that metal powders may be added to the material to improve the thermal and electrical conductivity, and in column 4 lines 40-46 discloses a composition where zinc powder, meeting the limitations of claims 11-12, is the metal powder.

It would have been obvious to one of ordinary skill in the art to include the zinc powder of Korshak in the encapsulated lubricant of Baumann, Beckmann, and Kakehi

as Korshak teaches that zinc powder is effective in improving the thermal and electrical conductivity of self-lubricating plastics.

6. Claims 1 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumann in view of Beckmann and Yamashita.

The discussion of Baumann and Beckmann in paragraph 3 above is incorporated here by reference. Baumann discloses a piston ring made of a self-lubricating plastic, and Baumann discloses a plastic material that has lubricant-containing microcapsules dispersed within. Baumann and Beckmann do not disclose a plastic where the polymer matrix is selected from the group recited in claim 1, nor do they disclose the limitations of claims 7-10.

From column 8 line 58 through column 9 line 9 (Example 1), Yamashita discloses an example where a porous material contains microcapsules containing an alpha-olefin lubricating agent. The lubricating agent is low in acidity, as in claim 9, and has a viscosity of 28 cSt, falling within the range recited in claim 10. The microcapsules have an average diameter of 15 μm , within the range recited in claim 7. In column 6 lines 11-25, Yamashita teaches that the material can further comprise polytetrafluoroethylene (PTFE, line 24). Additionally, the material of Example 1 comprises 25% by weight of the microcapsules (60 parts of 240), within the range recited in claim 8.

It would have been obvious to one of ordinary skill in the art to use the microcapsules of Yamashita in the plastic material of Beckmann, in order to form a material where the microcapsules break due to heating rather than frictional stress. It

would have been obvious to include PTFE in the material in order to further enhance the lubricity, and because Baumann teaches that the piston ring can be Teflon, which can be PTFE.

7. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumann in view of Beckmann and Yamashita as applied to claims 1, 3-4, 6, and 18 above, and further in view of Korshak.

The discussion of Baumann in view of Beckmann and Yamashita in paragraph 6 above is incorporated here by reference. Baumann, Beckmann, and Yamashita disclose a piston ring made from a self-lubricating plastic in accordance with claim 1 which may comprise a liquid lubricant incorporated into the microcapsules but does not disclose the further addition of lubricant additives.

Korshak, in column 1 lines 4-17 and column 2 lines 1-13 discloses a self-lubricating plastic material. In column 4 lines 47-52 Korshak teaches that metal powders may be added to the material to improve the thermal and electrical conductivity, and in column 4 lines 40-46 discloses a composition where zinc powder, meeting the limitations of claims 11-12, is the metal powder.

It would have been obvious to one of ordinary skill in the art to include the zinc powder of Korshak in the encapsulated lubricant of Baumann, Beckmann, and Yamashita as Korshak teaches that zinc powder is effective in improving the thermal and electrical conductivity of self-lubricating plastics.

Response to Arguments

8. Applicant's arguments submitted 8/23/07 have been considered but are moot in view of the new grounds of rejection necessitated by the amendments.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Goloboy whose telephone number is 571-272-2476. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

James C. Colby
JCG



Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700